CLAIMS

1. A vacuum pump comprising a pair of screw rotors each having a substantially hollow-cylindrical shape with one end closed, each having a plurality of helical land portions and a plurality of helical groove portions, and adapted to rotate about substantially parallel two axes while meshing with each other;

a casing receiving therein said pair of screw rotors;

a pair of shafts provided so as to extend from the closed ends on the cylinder inside of said pair of screw rotors, respectively, and supporting said pair of screw rotors, respectively; and

a pair of bearing members each having a substantially hollow-cylindrical shape and disposed between inner circumferential surfaces of rotor cylinders of said pair of screw rotors and outer circumferential surfaces of said pair of shafts, respectively, said pair of bearing members having bearings at inner circumferential surfaces thereof, respectively; characterized in that:

a shaft seal structure is provided around an outer circumferential surface of said bearing member located on the cylinder inside of each of said screw rotors;

said shaft seal structure forming a static pressure seal, and a seal gas being introduced between said outer circumferential surfaces of said bearing member and inner circumferential surfaces of said rotor cylinders of said screw rotors through said bearing members.

2. A vacuum pump according to claim 1, wherein each of said screw rotors is centered with respect to said bearing member by said introduced seal gas.

3. A vacuum pump according to claim 1 or 2, wherein said shaft seal structure comprises a substantially hollow-cylindrical shaft seal member installed in a concave portion circumferentially formed on said outer

circumferential surface of said bearing member and said shaft seal member is not in contact with said inner circumferential surface of said rotor cylinder during the stationary operation.

4. A vacuum pump according to any one of claims 1 to 3, wherein said shaft seal structure comprises said shaft seal member including a porous member and the seal gas is introduced between said outer circumferential surface of said bearing member and said inner circumferential surface of said rotor cylinder of said screw rotor through said shaft seal member from said bearing member.

5. A vacuum pump according to claim 4, wherein said porous member has a porosity of 1% to 20% and a gas introduction pressure to said porous member is 2MPa to 100MPa.

6. A vacuum pump according to claim 3, wherein said shaft seal member has a seal gas passing port opened in a radial direction and the seal gas is introduced between said outer circumferential surface of said bearing member and said inner circumferential surface of said rotor cylinder of said screw rotor through said shaft seal member from said bearing member.

7. A vacuum pump according to claim 6, wherein said seal gas passing port is provided at a position in a cylinder axis direction of said bearing member where back diffusion of the seal gas does not occur either to said screw rotor side or to said bearing side.

8. A vacuum pump according to any one of claims 3 to 7, wherein said shaft seal member comprises a plurality of substantially hollow-cylindrical shaft seal member pieces that are juxtaposed in said concave portion while partly overlapping each other in the cylinder axis direction of said bearing member and urging means is disposed between said shaft seal member pieces for urging said shaft seal member pieces in said cylinder axis direction in said concave portion.

9. A vacuum pump according to any one of claims 3 to 7, wherein said shaft seal member is formed by a single substantially hollow-cylindrical component and an O-ring is disposed at an end surface of said shaft seal member for urging said shaft seal member in said cylinder axis direction in said concave portion.

10. A vacuum pump according to any one of claims 3, 6, and 7, wherein said shaft seal member is integrally formed with said bearing member.

11. A vacuum pump according to any one of claims 1 to 10, wherein a gap between said outer circumferential surface of said bearing member and said inner circumferential surface of said rotor cylinder of said screw rotor is formed in a tapered shape so as to expand as approaching an exhaust side of an exhaust gas of said vacuum pump.

12. A vacuum pump according to any one of claims 1 to 11, wherein the seal gas is set to such flow velocity that prevents occurrence of back diffusion of the exhaust gas from the exhaust side of said vacuum pump and further prevents oil from flowing into the pump side from the bearing side.